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9. ABSTRACT

The influence of Moslem Water Law and the improved irrigation practices and techniques that accompanied the spread of Islam have had a remarkable and important impact on the Iberian peninsula, and in particular upon the irrigation system of Valencia. The system of water users association that developed within the Hispano-Muslim society has been a model used in several parts of the world and continues to be studied for its application where agriculture is essential and water limited. Pakistan applies Moslem water law principles at the local level in the allocation and distribution of water to agricultural users. At the governmental level, however, water management is a provincial matter, and in three of the four provinces, the Canal and Drainage Act of 1873, introduced by the British, still is the rule of law. The interesting feature is that one of the largest and oldest irrigation systems in the world has been suffering from decay the past 50 to 80 years. Salinity is causing the loss of production on thousands of acres of land each year.

The major problem is improper management at the farm level and lack of coordination among the provinces. Basically, the very principles that have helped create a very efficient and effective irrigation system in Valencia and in other Spanish districts have not had the same impact in Pakistan, perhaps due to a failure to adapt to the changing social and economic conditions of the Indus.

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MOSLEM WATER LAW AND ITS INFLUENCE ON SPANISH WATER LAW
AND THE IRRIGATION SYSTEM OF VALENCIA

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MOSLEM WATER LAW AND ITS INFLUENCE ON SPANISH WATER LAW
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I. Introduction

It is a real pleasure and honor to be here in Quito and participate in this important seminar.

This meeting is a further illustration of worldwide concern over proper and coordinated development, control, and management of natural resources. During the past year, I have been working for the United Nations, New York, in the field of water resources economics and legislation, and have observed a global trend in the water legislation and administration field. This trend is to modernize and streamline the national water law systems consistent with social, technological, and economic changes. Since the 1960's, major revisions or adoptions have taken place in over a dozen countries or states. In addition to the countries in South and Central America that are in the process of changing their water legislation and means of implementation, at least six African countries are in the process of enacting or revising water codes. In Asia, the countries of Afghanistan, Pakistan, Nepal, and several countries of the Mekong Delta are re-examining their water laws.

Perhaps the most significant current trend is the emphasis placed upon the formulation of sound national and regional water policies. From a general review of national water laws, the one single element most frequently absent is the water policy. It is interesting to note that many countries experiencing water resources development and control problems are the

same nations without comprehensive and well-defined guidelines to be applied in the development of their water resources. Those countries having the greatest success in the efficient use of their water have defined their goals and objectives and have translated them into policies. In addition to the efforts of this group and its sponsors, the United Nations has been concerned with the problems and has brought together groups of experts and held conferences to deal with the subject. One such group of experts held meetings in Vienna and New York in 1969-1971, respectively, to prepare a report on water resources policies, and a United Nations conference in New Delhi, India, last January, 1973, concentrated on the administrative aspects of water resources management. Both reports will be available in a few months.

II. Evolution of Water Law Systems and Importance of Comparative Analysis

Control and regulation of water resources are as ancient as the earliest civilizations that grew and flourished in the fertile valleys of the Hwang Ho, Tigris-Euphrates, Indus, and Nile Rivers. As degrees of physical utilization of the land and water resources took place, there came a point where the necessity to regulate the distribution and use of the water was recognized. Custom and logic went into the early control schemes, and, as their importance grew within the ancient society, rudimentary codifications were made. The water provisions in the Code of Hammurabi, the Laws of Manu, and Roman and Pharaonic rules illustrate the recognized need for control and acute awareness of the physical systems in operation.

These ancient water laws were as much a product of their environment as modern day codes and laws are of our environment. The general nature of the regulatory measures took into account the geo-climatic conditions (aridity vs. humidity) and the socio-economic idiosyncrasies of the society. The laws provided economic stability and security of tenure to the water users. In addition, as observed by Dr. Dante Caponera of FAO in his research, where the rules induced efficient use of water, they have been one of the pillars upon which early civilizations grew, and conversely, where adequate controls were not imposed upon the users, the laws served as one of the factors leading to decay.

As civilizations grew, their sophistication in control and management also increased. Customary practices took on the appearance of authority and this authority was incorporated into the scheme of control. Gradually a legal system of regulation emerged which--like other elements of societies, such as marriage, land ownership, etc.--spread with the conquests and movements of the civilization. As we shall see in the case of Valencia, Spain and the rest of the Al-Andalus most often the major philosophy and doctrines were transferred along with the practices and technologies they controlled.

From the time when these earliest of systems can be traced, going back to 3000 B.C. in China and Mesopotamia to the present, we find several identifiable water law systems have emerged. The most distinct are the Roman, Moslem, French, Spanish, Chinese, English, North American and Russian. Throughout time, as conquests and influences spread around the world, these systems were transferred and made their impact. Figure 1 illustrates this theory of system transfer. It is not an exhaustive map of the paths of influence, but rather a spatial capsule of the transfer process.

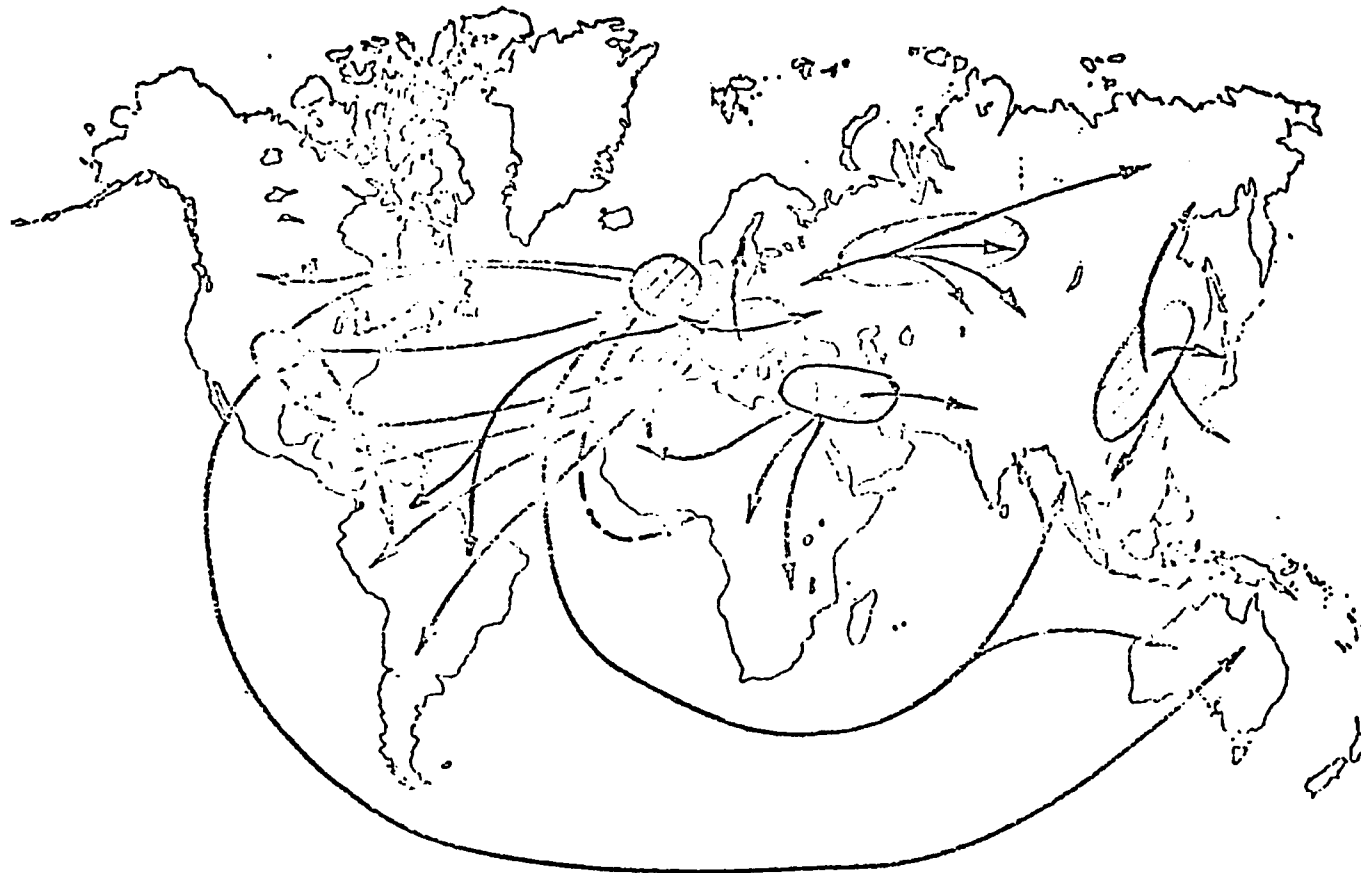


Figure 1 A Descriptive Map of Proposed Examination of Major Legal Systems (▨) and Their Variations or Paths of Influence(→). (This is not an Exhaustive Description but Only Indicative Categorizations.) Radosevich, Vlachos, and Skogerboe, 1973

Examining the major water law systems and conducting a comparative analysis of national water legislation and administration systems is an important step to identifying and understanding the underlying philosophy behind the alternative approaches to water resources development and management. This understanding greatly increases the total effectiveness and ability of appraising a national system of water control. Further, in the process of analyzing the various substantive and administrative aspects of the water law systems, principles facilitating or constraining the efficient and effective allocation, distribution and management of water resources are identified. Knowing the background and principles of these systems will allow the legislator or draftsman to select the alternative approaches most suitable to implementing the goals and objectives of the recipient country, cognizant of the stage of technological, social, and economic development. Many examples of direct transfers of water codes or systems of administration exist. Unfortunately, their rate of success in meeting the needs of the enacting country is not impressive. Often the recipient country's political system does not function in the same manner as the donor country's and the climatic conditions, social needs and stage of development are widely different.

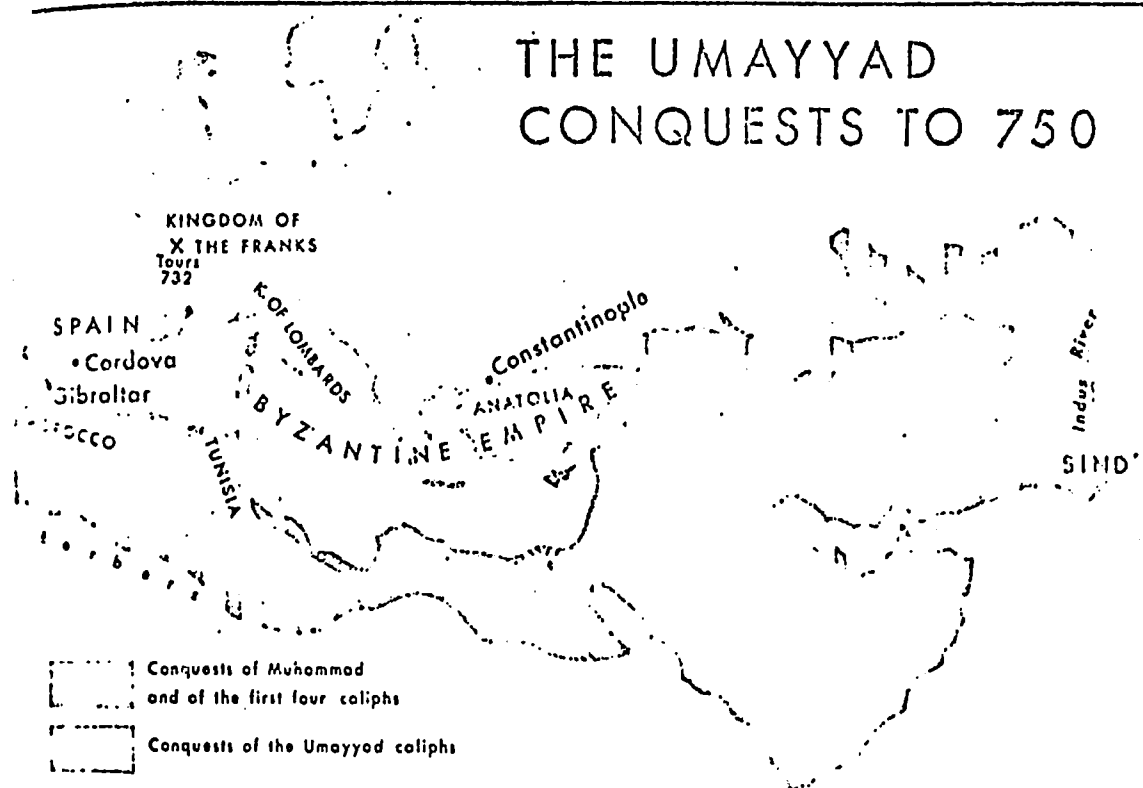
III. The Evolution and Influence of a System

Each of the major water law systems have had a significant impact upon their area of influence, often in terms of the rate of optimization of the water and related resources. The importance to the present water management and economic conditions of the receiving areas in several cases can still be readily witnessed. One system of water law having particular significance upon the manner in which water is used and managed in many areas of the world

is the Moslem water law system. Its influence still remains in certain areas of the world that have developed their own system of water regulations. Such an evolved system, of importance to countries in South America for its influence in this hemisphere, is the Spanish water law system.

Moslem water law is an integral part of the Islamic religion, and as a consequence its principles spread with the spread of Islam. Islamic history has its beginning in the Arabian peninsula around 625 A.D., during the life of its founder, Mohammad. Although Mohammad had little success initially with his new-found religion, it was not long before he acquired many followers among the Bedouins of these arid lands. Mohammad's equalitarian philosophy was particularly appealing to the slaves and members of oppressed groups. Soon Arabia was transformed into a Moslem nation and twenty years after Mohammad's death, the Koran was prepared to perpetuate the teachings of Islam. It still remains the document of highest authority. After Mohammad's death, Islam spread rapidly throughout the Middle East. Under the first four caliphs, Syria was conquered in 636, Persia in 642, and the greater part of Egypt by 640. Then the Umayyad Dynasty took hold of the Islamic leadership from 661 to 750, and, through its conquests, spread Islam into the Indian subcontinent and throughout North Africa down to Mauritania.

The next step in the Islamic movement, carried out by the Moors, was to cross the Straits of Gibraltar in 711. Under the leadership of General Tarik, the Moors succeeded in overcoming the kingdom of the Visigoths in the Iberian Peninsula. Hence we have the introduction of a completely different way of life into the former Germanic-Roman governed lands and the creation of the Al-Andalus.



In addition to Islam's carrying forth a religion wherever it spread, it brought two more significant features, a language and a system of government. The book of Islam, the Koran, is read and recited by Moslems in Arabia, and so regardless of the native language of the conquerers and conquered, Arabic became a part of the infusion. Islam also called for a system of government with the religious ruler at the apex of both religious and political activities. A body of law called Sunna governed all the activities of Muslim life and the mosque became the center of both worship and community life, a gathering place to raise and resolve local problems.

The Moslem water law that existed at the time of the Moorish invasion into Spain was molded out of the basic precepts of Islam and the customary water use practices in the Arabian lands of the seventh century. As a result, not only the law but also the system of irrigation was transferred into the Iberian Peninsula.

In pre-Islamic time, customary practices allowed the owner of a well to sell his water and as a consequence to exercise the evils of extracting whatever he could from the needy. In other areas where agriculture was practiced, river diversions and the uses of water wheels and qanats were developed in an effort to maximize the benefits from the available resources. What is surprising is the understanding that these early water users had in the hydraulic interrelationship that exists between ground and surface waters and how their technology could be applied to use conjunctively these resources.

Islam adopted many of these customary practices. However, the most significant changes emerging from the absorption of the existing practices into the evolving Islamic Society which altered the existing relationship between man and water was the infusion of two basic Moslem principles: The concept of

equality is an Islamic principle which extends into every facet of life and activity of the Moslem. Extended to water resources, it is applied to the ultimate, dividing and distributing water to the community. A companion principle that further led to (later developed) management practices was that water, like air and light, was common property for use by the entire community. Together, these principles of equality and common property abrogated the customary practice of selling water and other activities that led to appropriating water supplies to the detriment of fellow men and animals. In general, there could be no preventing the use of water for human beings and animals.

Regarding the right to use flowing waters in streams and rivers for irrigation, navigation or manufacturing, this was permissible so long as the use did not interfere with domestic uses.

The most extensive treatment of water use under Islam is contained in the Mejelle, which codifies Hanafi law concerning transactions between people and nature, and the Hedaya, which is a commentary on Moslem Laws. In the Mejelle, provisions are made for rights of way for channels over another's land, use of public wells and rivers, sharing and taking turns when using water for irrigation, the digging of wells, and spacing requirements. The Hedaya makes extensive treatment of the cultivation of waste lands and construction of wells and qanats to reclaim such areas. From the Koranic principles, the Hedaya and Mejelle, and other codification of Moslem law evolved the system of control and administrative mechanisms that so greatly influenced agriculture wherever Islam was practiced.

IV. The Impact of the Moorish Conquest in Spain and Particularly the Irrigation System of Valencia

The Moors invaded Spain in 711 through Gibraltar, and within a few years

had taken almost the entire Iberian Peninsula and penetrated up to the Mediterranean coastal area of France. Prior to this invasion, the Visigoths (of German origin but very highly Romanized) had control of the country, since 400 A.D. Under the latter's control some elements of Roman law of water use were implemented, and in many places around the peninsula Roman water works were constructed. However it is the consensus of most historians and technology researchers that the law and irrigation practices were rudimentary during the rule of the Visigoths.

The Moorish invasion into the European continent brought with it the highly refined irrigation methods of the Arab farmers, the machinery for measuring water and tapping sources that had been unused in the past. The whole system of artificial watering was Oriental and Moorish.

Spain had similar climatic conditions to many of the Arab countries, and within a short time the newcomers introduced several techniques which led to the intensification of irrigation practices. The most notable and still remaining devices diffused throughout the country were 1) the dam for raising the level of water for diversion into canals, 2) the noria, or Persian wheel, for lifting water, and 3) the qanat, or subsurface to surface gravity flow conduit.

The noria, or Persian wheel was an improved version of the current wheel that existed since early Roman times. The change attributed to the Arabs was the addition of animal power to drive the wheel when currents were absent and to lift water from tanks. The Arabs are credited with the diffusion of the noria

in North Africa and Iberia. The water wheel can be found in high concentrations in the southwest around Algarve and North of Lisbon, and around Andalusia and Murcia in the southeast. The noria was later improved upon by Christian Spain and introduced into Mexico, less extensively into South America.

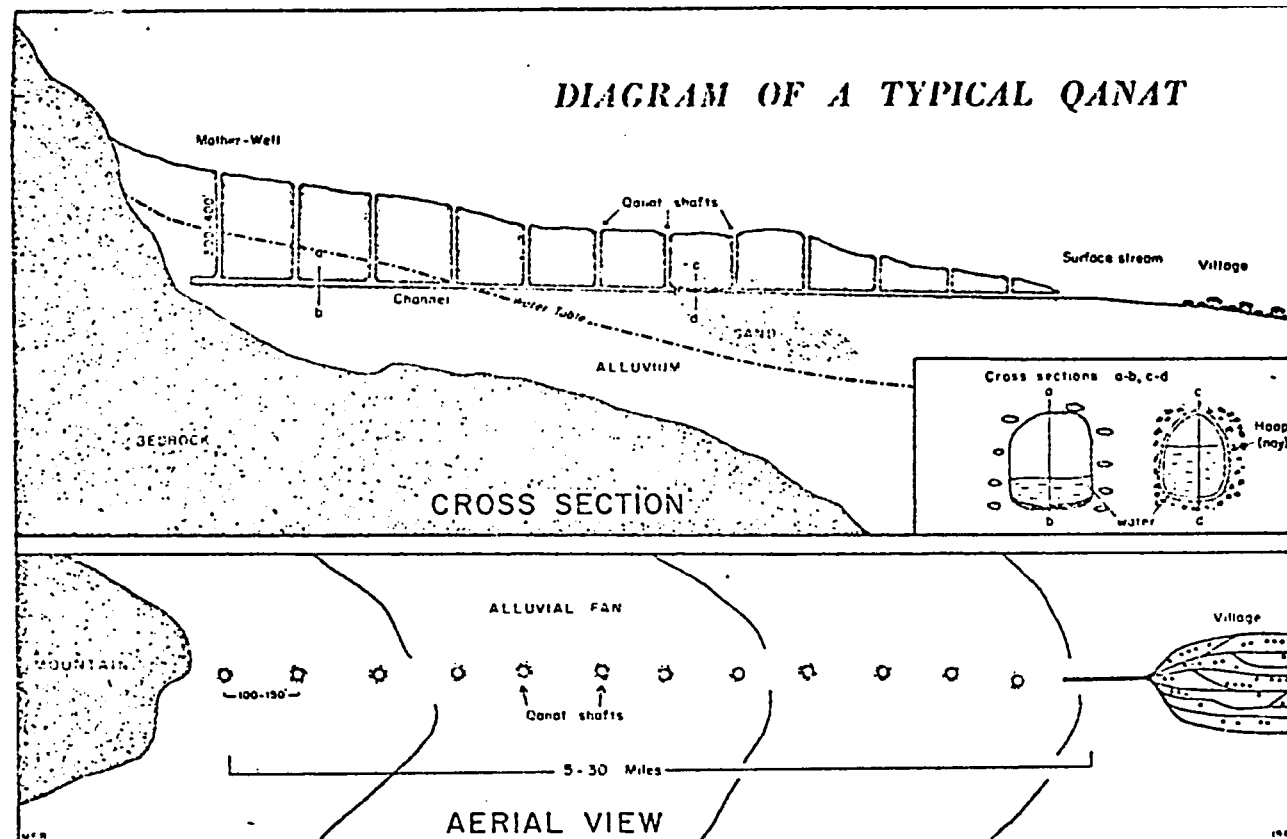
The third system of water conveyance which the Moorish conquerors are credited with diffusing in Spain is the qanat, an underground conduit for tapping groundwater and using gravity flow to bring it to the surface. This system consists of a series of wells connected by a horizontal underground shaft. They begin high on an alluvial fan where the "mother well" taps the percolating waters. The conduit carries it out from the mountain to the agricultural valley. Shafts range from 300 feet deep to 50 feet deep and the horizontal conduit may be several miles long.

The qanat, known by various names throughout the Moslem world (karaze in Pakistan and Afghanistan, foggaras in Algeria, hattaros in Morocco) had its origin in Persia 3000 years ago. The technique was quickly absorbed by the Moslems and has a history of application parallel to the spread of Islam. Throughout Iran, Baluchistan and Afghanistan, great mounds of earth from the vertical shafts can be seen dotting the arid alluvial fans. In Spain, qanats are primarily found in the south, east and central portion of the country.

Other contributions brought by the Moors include the construction of elaborate canal systems, establishment of tanks and gardens, introduction of several exotic plants, and installation of basic Muslim philosophy into the administration of irrigation systems.

In Granada, it is widely held that the famous canals were made by Mohammad Alhamer between 1242 and 1273 when the Alhambra was being built. The Moors

DIAGRAM OF A TYPICAL QANAT



were as fond of fountains, tanks and gardens as they were of irrigating fields, and consequently, Granada and other Moorish strongholds contain many such reminders.

V. The Irrigation System of Valencia

In order to consolidate the discussion of Moslem influence upon the law and administration in Spain, the irrigation system of Valencia has been selected since it perhaps was more greatly affected by the Moors than any other irrigation system in Spain. It has also retained the evidence of these effects through time.

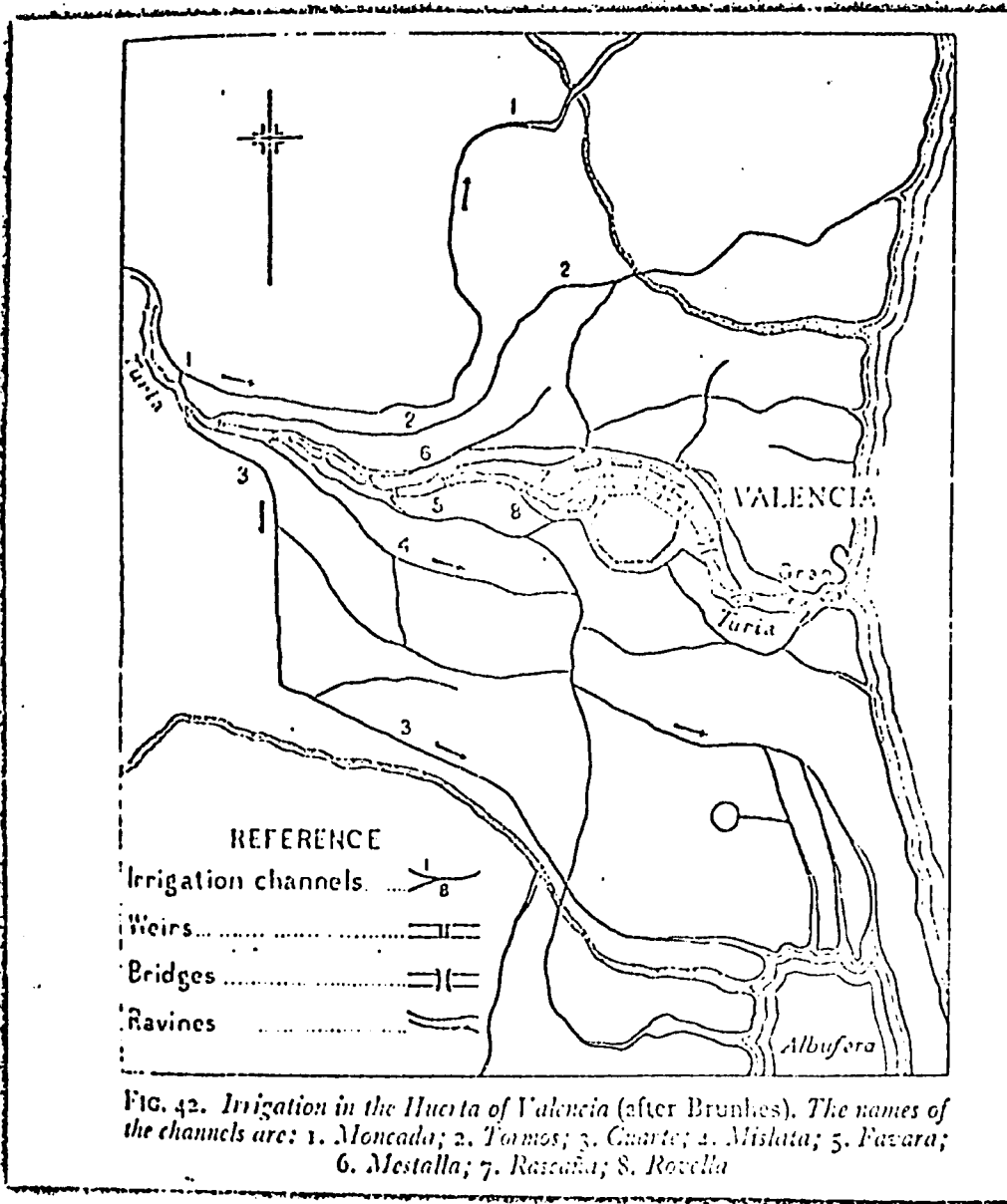
The history of Valencia for our purposes begins in 711 with the Moorish conquest of the peninsula. Prior to this time the law of Valencia was predominantly Roman with strains of German customary and canal law. The invaders found a broad and highly fertile plain at the mouth of the Turia River, but the area lacked an effective water distribution system and the capacity of the region to grow crops was not fully utilized. Almost immediately the newcomers set to work capitalizing upon the natural resources. The principles of Islam were superimposed and, during the reign of Caliph Alhaken II, the first systematic irrigation system and management scheme in Spain was created in Valencia and Granada. The Moors introduced canal systems, new exotic plants and trees, and, most important, a uniquely simple but effective management and organizational system based upon Moslem water law. The canal system that was either built or added to by the Moors consisted of canals taking off from the Turia River.

Moslem rule in southeastern Spain began to disintegrate in the 11th Century and was finally concentrated in Granada from 1232 to 1492. Valencia was temporarily recaptured in 1094 by Cid Campeador and permanently taken in 1232

by Jamie I of Aragon. Recognizing the skill of the Moorish farmers, one of the first decrees issued by Jamie I stated that the water should be taken and used in the order established within the communities of irrigations. Jamie I allowed seven of the eight canals to be retained by the people of Valencia. The eighth, the Moncada, he kept for his personal use until 1268, and the canal still remains autonomous. As a result of the early precedent set by Jamie I, Valencia was actually irrigated by Moorish farmers until 1610.

The irrigation system of Valencia is fed by the Turia River or Guadalaviar ("white river" in Arabic). The Turia is about 160 miles long and begins in the Sierra de Molino, west of Valencia. It runs through valleys and ravines for about 140 miles of its length before entering the beautiful huerta of Valencia. The river runs through the middle of the plains and, from where it enters the valley to midway through, eight canals take off the main stream alternating left and right. These original eight canals are said to have been constructed or greatly improved on by the Moors. Many of the old masonry and stone weirs that date back to the 11th Century can still be seen. The system of water allocation and distribution that led to the calculation of the canal and outlet size was based upon the Muslim concept that water is community property and must be equitably apportioned among the community. To insure this proportional distribution among the irrigators, a series of minor canals and ditches were constructed from the major canals, varying in size according to the area to be irrigated under this charge.

So where the engineer left off, the legislation began. A system of administration developed to insure that water was delivered in the most equal portions possible. All irrigators receiving water from a particular canal were equal and had a right to a share in the water according to the size of their holdings. When the supply of water is abundant, there is little restriction



to the use of the waters. However, when a scarcity occurs, the old Islamic principle of proportionality is implemented. Water delivery is divided into hours of the day and days of the week, with each irrigator having a turn based upon the acreage and type of crop grown. In this manner, each irrigator can adjust the cropped land according to the water supply and all can at least grow some products. The rules are simple and direct. The system operates almost automatically since the outlets into the canals and cequias will allow a flow corresponding to the area to be irrigated.

Administration of the irrigation system is carried out by a community of irrigators. The community owns the water and sees that it is equitably distributed. Three distinct principles pervade the community of irrigators in their efforts to seek maximum cooperation through direct administration. They are:

1. concept of proportional distribution--each cultivator receives water in proportion to the land he irrigates,
2. concept of individual responsibility to the community for upkeep of his part of the canal and prevention of waste in water use,
3. concept of collective responsibility by self-government and management only by community.

The organizational arrangement of the community consists of a President, Vice-president, Representatives from throughout the canal system, a Secretary, and an Assessor. In addition, the President of each community serves as the Water Syndico or Trustee. This leadership of a community of irrigators serves as a jury to decide all disputes between irrigators of that canal. It can also decide if certain crops should not be grown and, in general, is responsible for the efficient use of water allotted to it.

The most notable contribution of the Moorish influence upon the irrigation system of Valencia is the famed Tribunal de las Aguas, thought to be instituted

by the Moor, Alhaken Almonstansir Billar in 960. This court, which consists of the Syndicos from each of the seven communities of irrigators, was developed to keep the peace within the Valencian irrigation system. Its operation was so effective that Jamie I retained it after the Christians reconquest in 1232. It is truly a primitive and oriental body which carries forth justice in a summary fashion.

The tribunal meets every Thursday at noon in the open on special benches at the La Puerta de los Apostoles at the Cathedral of Valencia. Prior to the conquest of Jamie I this tribunal met at the gate or entrance to a mosque, but after the Christians reclaimed Valencia the mosque was destroyed and the present cathedral constructed. The philosophy behind meeting at the gate in the open air is that one shall submit to God and his fellow man to be judged and will be less inclined to deviate from the truth. Likewise, the judges will be under the shadow of the "Gate" and attempt to deliver judgments in the most just manner.

The court conducts its proceedings in a simple and direct manner--typifying the philosophy of its creators. No barristers or attorneys practice before the court, there is no writing down of evidence or decisions, and there is no appeal. Although the court is voluntary and the accused does not have to submit to its jurisdiction, the economics and swiftness of its decision are substantial factors in deciding whether to go before the civil court or Tribunal.

To insure justice and impartiality, the accused is brought before the Tribunal and in everyone's presence the evidence is presented against him. He can defend himself and call upon others who have testimony. He may be subjected to questions from the President of the court and other members of the Tribunal. To achieve impartiality, Syndicos of the canals on the opposite side of the river from the accused pass sentence on him. The Syndico from the accused's community then applies the penalty under the laws of that community. According

to Senor Vicente Giner, a noted water lawyer in Valencia who has studied all available accounts of the Tribunal, the procedure and proceedings are virtually the same now as during the 10th Century.

VI. The Impact upon Spanish Water Law

The Moors brought with them into Spain the ingenuity of their irrigation skills and principles of water use that find their basis in Muslim water law and the commentaries and codifications that have been written down since the death of the Prophet Mohammad. To this diffusion of technology and implanting of ideas in the Iberian peninsula, one observation must be made to place the historical events since the 8th century in proper perspective. The influence of the Moslems primarily was directed and remained at the local level. The canals and irrigation systems, the community of irrigators, and the ancient tribunals all were designed to function within a limited geographical area.

The Spanish water law system as it is known today was more greatly influenced by Roman law. The division of waters into public and private properties and the concepts of navigability and non-navigability stem from the Justinian code. The law has centralized water management but still retains local control.

Spanish water law was codified for the first time in 1866 and additions enacted in 1879. Following the precedent set by Jamie I, this codification recognized the localized influences of the Moorish culture in several provisions. Chapter XV, Article 279 provides for the establishment of syndicates, elected by the entire community of irrigators. Article 281 permits the irrigation community to form their own rules and regulations.

The most significant provisions in the Act of 1866, Articles 290-293 provide for creation of tribunals of irrigators in each irrigation community. The law requires that the proceedings of these tribunals be public and verbal, but the decisions must be written down and recorded in a book.

Article 294 preserves the tribunal of waters. It states "where ancient irrigation tribunals exist, they shall continue with their actual organization as long as their respective communities do not agree to propose their reform to the Government." The tribunal of waters of Valencia has stood the test of time, despite many attempts to abolish it. It still remains the symbolic and functional remnant of the Moorish influence in Spain.

VII. Conclusion--Now the Pendulum Swings

The influence of Moslem Water Law and the improved irrigation practices and techniques that accompanied the spread of Islam have had a remarkable and important impact on the Iberian peninsula, and in particular upon the irrigation system of Valencia. The system of water users association that developed within the Hispano-Muslim society has been a model used in several parts of the world and continues to be studied for its application where agriculture is essential and water limited.

It is particularly interesting to observe the contributions left by the Moors and the retention of the basic principles of water allocation, distribution, and administration throughout the history of water use in Valencia. Many improvements have been made upon the irrigation systems and the water laws after the reconquest in the 12th and 13th centuries. Professor Teclaff notes in his study for the United Nations that, while the Moslem influence was preserved in the local areas, the Roman law that was injected into the peninsula with the return to Christianity had the greatest impact upon the national system of Spanish water law as we know it today.

A corollary to this study of Moslem water law effects in Spain is the study I have been conducting in Pakistan of the customary and legislative water laws of that country and the administrative system from the water user to national governmental control. Pakistan applies Moslem water law principles at the local level in the allocation and distribution of water to agricultural users. At the governmental level, however, water management is a provincial matter, and in three of the four provinces, the Canal and Drainage Act of 1873, introduced by the British, still is the rule of law. The interesting feature is that one of the largest and oldest irrigation systems in the world has been suffering from decay the past 50 to 80 years. Salinity is causing the loss of production on thousands of acres of land each year.

The major problem is improper management at the farm level and lack of coordination among the provinces. Basically, the very principles that have helped create a very efficient and effective irrigation system in Valencia and in other Spanish districts have not had the same impact in Pakistan, perhaps due to a failure to adapt to the changing social and economic conditions of the Indus.

The pendulum may now swing back in the other direction, and the efficiencies gained through the highly developed administrative structure of the Valencian community of irrigators and the tribunal of waters, based upon equality and simplicity, could provide the direction and impetus to improved water management in Pakistan. The similarities and familiarities of both systems would allow an easy transfer of knowledge and operation.

This is one example of the value that can be derived from analyzing the evolution and influence of water law systems. Many others exist, perhaps right here among the Andean Pact countries.

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